# Seventh Grade – Mathematics

Kentucky Core Academic Standards with Targets

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| **Grade Level/ Course (HS): 7th Grade** | |
| **Standard with code:** | **7.RP.1 Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units.** ***For example, if a person walks 1/2 mile in each 1/4 hour, compute the unit rate as the complex fraction*** $^{1/2}/_{1/4}$ ***miles per hour, equivalently 2 miles per hour.*** |
| **Domain:** | **Ratio and Proportional Relationships** |
| **Cluster:** | **Analyze proportional relationships and use them to solve real-world and mathematical problems.** |
| **Type: __X___Knowledge _____Reasoning _____Performance Skill _____Product** | |

| **Knowledge Targets** | **Reasoning Targets** | **Performance Skills Targets** | **Product Targets** |
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| Compute unit rates associated with ratios of fractions in like or different units. | | | |

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| Make sense of problems and persevere in solving them. | Reason abstractly and quantitatively. | Construct viable arguments and critique the reasoning of others. | Model with mathematics. | Use appropriate tools strategically. | Attend to precision. | Look for and make use of structure. | Look for and express regularity in repeated reasoning. |

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| **Grade Level/ Course (HS): 7th Grade** | |
| **Standard with code:** | **7.RP.2abcd Recognize and represent proportional relationships between quantities.**<br>**a. Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.**<br>**b. Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.**<br>**c. Represent proportional relationships by equations. *For example, if total cost t is proportional to the number n of items purchased at a constant price p, the relationship between the total cost and the number of items can be expressed as t = pn*.**<br>**d. Explain what a point *(x, y)* on the graph of a proportional relationship means in terms of the situation, with special attention to the points (0, 0) and (1, *r)* where *r* is the unit rate.** |
| **Domain:** | **Ratio and Proportional Relationships** |
| **Cluster:** | **Analyze proportional relationships and use them to solve real-world and mathematical problems.** |
| **Type: _____Knowledge ___X___Reasoning _____Performance Skill _____Product** | |

| Knowledge Targets | Reasoning Targets | Performance Skills Targets | Product Targets |
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| Know that a proportion is a statement of equality between two ratios.<br><br>Define constant of proportionality as a unit rate.<br><br>Recognize what (0, 0) represents on the graph of a proportional relationship.<br><br>Recognize what (1, *r*) on a graph represents, where *r* is the unit rate. | Analyze two ratios to determine if they are proportional to one another with a variety of strategies. (e.g. using tables, graphs, pictures, etc.)<br><br>Analyze tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships to identify the constant of proportionality.<br><br>Represent proportional relationships by writing equations.<br><br>Explain what the points on a graph of a proportional relationship means in terms of a specific situation. | | |

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| Grade Level/ Course (HS): 7th Grade | |
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| **Standard with code:** | **7.RP.3 Use proportional relationships to solve multistep ratio and percent problems.** ***Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error.*** |
| **Domain:** | **Ratio and Proportional Relationships** |
| **Cluster:** | **Analyze proportional relationships and use them to solve real-world and mathematical problems.** |
| **Type: _____Knowledge ___X___Reasoning _____Performance Skill _____Product** | |

| Knowledge Targets | Reasoning Targets | Performance Skills Targets | Product Targets |
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| Recognize situations in which percentage proportional relationships apply. | Apply proportional reasoning to solve multistep ratio and percent problems, *e.g., simple interest, tax, markups, markdowns, gratuities, commissions, fees, percent increase and decrease, percent error, etc.* | | |

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| Make sense of problems and persevere in solving them. | Reason abstractly and quantitatively. | *Construct viable arguments and critique the reasoning of others.* | Model with mathematics. | Use appropriate tools strategically. | Attend to precision. | Look for and make use of structure. | Look for and express regularity in repeated reasoning. |

| Grade Level/ Course (HS): 7th Grade | |
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| **Standard with code:** | **7.NS.1abc Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram.**<br>**a. Describe situations in which opposite quantities combine to make 0.** ***For example, a hydrogen atom has 0 charge because its two constituents are oppositely charged.***<br>**b. Understand *p + q* as the number located a distance *\|q\|* from *p,* in the positive or negative direction depending on whether *q* is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts.**<br>**c. Understand subtraction of rational numbers as adding the additive inverse, *p – q = p + (–q)*. Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts.** |
| **Domain:** | **The Number System** |
| **Cluster:** | **Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.** |
| **Type: _____Knowledge ____X___Reasoning _____Performance Skill _____Product** | |

| Knowledge Targets | Reasoning Targets | Performance Skills Targets | Product Targets |
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| Describe situations in which opposite quantities combine to make 0.<br><br>Represent and explain how a number and its opposite have a sum of 0 and are additive inverses.<br><br>Demonstrate and explain how adding two numbers, *p + q*, if *q* is positive, the sum of *p* and *q* will be *\|q\|* spaces to the right of *p* on the number line.<br><br>Demonstrate and explain how adding two numbers, *p + q*, if *q* is negative, the sum of *p* and q will be *\|q\|* spaces to the left of *p* on the number line.<br><br>Identify subtraction of rational numbers as adding the additive inverse property to subtract rational numbers, p-q = p +(-q).<br><br>**Mathematical Practices – next page** | Apply and extend previous understanding to represent addition and subtraction problems of rational numbers with a horizontal or vertical number line<br><br>Interpret sums of rational numbers by describing real-world contexts.<br><br>Explain and justify why the sum of *p + q* is located a distance of *\|q\|* in the positive or negative direction from *p* on a number line.<br><br>Represent the distance between two rational numbers on a number line is the absolute value of their difference and apply this principle in real-world contexts.<br><br>Apply the principle of subtracting rational numbers in real-world contexts.<br><br>Apply properties of operations as strategies to add and subtract rational numbers. | | |

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| **Grade Level/ Course (HS): 7th Grade** | |
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| **Standard with code:** | **7.NS.1d Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram.**<br>**d. Apply properties of operations as strategies to add and subtract rational numbers. Properties are listed in the Common Core State Standards Glossary, Table 3, Properties of Operations.** |
| **Domain:** | **The Number System** |
| **Cluster:** | **Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.** |
| **Type: _____Knowledge ____X___Reasoning _____Performance Skill _____Product** | |

| **Knowledge Targets** | **Reasoning Targets** | **Performance Skills Targets** | **Product Targets** |
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| Identifies properties of addition and subtraction when adding and subtracting rational numbers. | Apply properties of operations as strategies to add and subtract rational numbers. | | |

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| Grade Level/ Course (HS): 7th Grade | |
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| **Standard with code:** | **7.NS.2a Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.**<br>**a. Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property leading to products such as (-1)(-1) = 1 and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts.** |
| **Domain:** | **The Number System** |
| **Cluster:** | **Apply and extend previous understandings of multiplication and division of fractions to multiply and divide rational numbers.** |

| Knowledge Targets | Reasoning Targets | Performance Skills Targets | Product Targets |
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| Recognize that the process for multiplying fractions can be used to multiply rational numbers including integers.<br><br>Know and describe the rules when multiplying signed numbers. | Apply the properties of operations, particularly distributive property, to multiply rational numbers.<br><br>Interpret the products of rational numbers by describing real-world contexts. | | |

**Type: _____Knowledge __X____Reasoning _____Performance Skill _____Product**

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| Make sense of problems and persevere in solving them. | Reason abstractly and quantitatively. | Construct viable arguments and critique the reasoning of others. | Model with mathematics. | Use appropriate tools strategically. | Attend to precision. | Look for and make use of structure. | Look for and express regularity in repeated reasoning. |

| Grade Level/ Course (HS): 7th Grade | |
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| **Standard with code:** | **7.NS.2b Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.**<br>**b. Understand that integers can be divided provided that the divisor is not zero and every quotient of integers (with nonzero divisor) is a rational number. If p and q are integers, then –(p/q) = -p/q = p/-q. Interpret quotients of rational numbers by describing real-world contexts.** |
| **Domain:** | **The Number System** |
| **Cluster:** | **Apply and extend previous understandings of multiplication and division of fractions to multiply and divide rational numbers.** |
| **Type: _____Knowledge __X____Reasoning _____Performance Skill _____Product** | |

| Knowledge Targets | Reasoning Targets | Performance Skills Targets | Product Targets |
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| Explain why integers can be divided except when the divisor is 0.<br><br>Describe why the quotient is always a rational number .<br><br>Know and describe the rules when dividing signed numbers, integers.<br><br>Recognize that –(p/q) = -p/q = p/-q. | Interpret the quotient of rational numbers by describing real-world contexts. | | |

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| **Grade Level/ Course (HS): 7th Grade** | |
| **Standard with code:** | **7.NS.2c Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.**<br>**c. Apply properties of operations as strategies to multiply and divide rational numbers.** |
| **Domain:** | **The Number System** |
| **Cluster:** | **Apply and extend previous understandings of multiplication and division of fractions to multiply and divide rational numbers.** |
| **Type: _____Knowledge ___X___Reasoning _____Performance Skill _____Product** | |

| Knowledge Targets | Reasoning Targets | Performance Skills Targets | Product Targets |
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| Identify how properties of operations can be used to multiply and divide rational numbers (such as distributive property, multiplicative inverse property, multiplicative identity, commutative property for multiplication, associative property for multiplication, etc.) | Apply properties of operations as strategies to multiply and divide rational numbers. | | |

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| **Grade Level/ Course (HS): 7th Grade** | |
| **Standard with code:** | **7.NS.2d Apply and extend previous understandings of multiplication and division of fractions to multiply and divide rational numbers.**<br>**d. Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in zeroes or eventually repeats.** |
| **Domain:** | **The Number System** |
| **Cluster:** | **Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.** |
| **Type: __X____Knowledge _____Reasoning _____Performance Skill _____Product** | |

| Knowledge Targets | Reasoning Targets | Performance Skills Targets | Product Targets |
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| Convert a rational number to a decimal using long division.<br><br>Explain that the decimal form of a rational number terminates (stops) in zeroes or repeats. | | | |

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| **Grade Level/ Course (HS): 7th Grade** | |
| **Standard with code:** | **7.NS.3 Solve real-world and mathematical problems involving the four operations with rational numbers.[1]**<br><br>**[1] Computations with rational numbers extend the rules for manipulating fractions to complex fractions.** |
| **Domain:** | **The Number System** |
| **Cluster:** | **Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.** |
| **Type: _____Knowledge __X____Reasoning _____Performance Skill _____Product** | |

| Knowledge Targets | Reasoning Targets | Performance Skills Targets | Product Targets |
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| Add rational numbers.<br><br>Subtract rational numbers.<br><br>Multiply rational numbers.<br><br>Divide rational numbers. | Solve real-world mathematical problem by adding, subtracting, multiplying, and dividing rational numbers, including complex fractions. | | |

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| Grade Level/ Course: 7th Grade | |
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| **Standard with code:** | **7.EE.1 Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.** |
| **Domain:** | **Expressions and Equations** |
| **Cluster:** | **Use properties of operations to generate equivalent expressions.** |
| **Type: _____Knowledge ___X__Reasoning _____Performance Skill _____Product** | |

| Knowledge Targets | Reasoning Targets | Performance Skills Targets | Product Targets |
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| Combine like terms with rational coefficients.<br><br>Factor and expand linear expressions with rational coefficients using the distributive property. | Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients. | | |

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| **Grade Level/ Course: 7th Grade** | |
| **Standard with code:** | **7.EE.2 Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related. *For example, a + 0.05a = 1.05a means that "increase by 5%" is the same as "multiply by 1.05."*** |
| **Domain:** | **Expressions and Equations** |
| **Cluster:** | **Use properties of operations to generate equivalent expressions.** |
| **Type: _____Knowledge ____X__Reasoning _____Performance Skill _____Product** | |

| **Knowledge Targets** | **Reasoning Targets** | **Performance Skills Targets** | **Product Targets** |
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| Write equivalent expressions with fractions, decimals, percents, and integers. | Rewrite an expression in an equivalent form in order to provide insight about how quantities are related in a problem context | | |

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| Grade Level/ Course (HS): 7th Grade | |
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| **Standard with code:** | **7.EE.3 Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. *For example: If a woman making $25 an hour gets a 10% raise, she will make an additional 1/10 of her salary an hour, or $2.50, for a new salary of $27.50. If you want to place a towel bar 9 3/4 inches long in the center of a door that is 27 1/2 inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation.*** |
| **Domain:** | **Expressions and Equations** |
| **Cluster:** | **Solve real-life and mathematical problems using numerical and algebraic expressions and equations.** |
| **Type: _____Knowledge ___X___Reasoning _____Performance Skill _____Product** | |

| Knowledge Targets | Reasoning Targets | Performance Skills Targets | Product Targets |
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| Convert between numerical forms as appropriate. | Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically.<br><br>Apply properties of operations to calculate with numbers in any form.<br><br>Assess the reasonableness of answers using mental computation and estimation strategies. | | |

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| Grade Level/ Course (HS): 7th Grade | |
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| **Standard with code:** | **7.EE.4ab Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.**<br>**a. Solve word problems leading to equations of the form *px* + *q* = *r* and *p*(*x* + *q*) = *r*, where *p*, *q*, and *r* are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach. *For example, the perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?***<br>**b. Solve word problems leading to inequalities of the form *px* + *q* > *r* or *px* + *q* < *r*, where *p*, *q*, and *r* are specific rational numbers. Graph the solution set of the inequality and interpret it in the context of the problem. *For example: As a salesperson, you are paid $50 per week plus $3 per sale. This week you want your pay to be at least $100. Write an inequality for the number of sales you need to make, and describe the solutions.*** |
| **Domain:** | **Expressions and Equations** |
| **Cluster:** | **Solve real-life and mathematical problems using numerical and algebraic expressions and equations.** |
| **Type: _____Knowledge ___X___Reasoning _____Performance Skill _____Product** | |

| Knowledge Targets | Reasoning Targets | Performance Skills Targets | Product Targets |
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| Fluently solve equations of the form *px* + *q* = *r* and *p(x + q) = r* with speed and accuracy.<br>Identify the sequence of operations used to solve an algebraic equation of the form *px* + *q* = *r* and *p(x + q) = r*.<br>Graph the solution set of the inequality of the form *px* + *q* > *r* or *px* + *q* < *r*, where *p*, *q*, and *r* are specific rational numbers. | Use variables and construct equations to represent quantities of the form *px* + *q* = *r* and *p(x + q) = r* from real-world and mathematical problems.<br>Solve word problems leading to equations of the form *px* + *q* = *r* and *p(x + q) = r*, where *p*, *q*, and *r* are specific rational numbers.<br>Compare an algebraic solution to an arithmetic solution by identifying the sequence of the operations used in each approach. *For example, the perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width? This can be answered algebraically by using only the formula for perimeter (P=2l+2w) to isolate w or by finding an arithmetic solution by substituting values into the formula.*<br><br>Solve word problems leading to inequalities of the form *px* + *q* > *r* or *px* + *q* < *r*, where *p*, *q*, and *r* are specific rational numbers.<br>Interpret the solution set of an inequality in the context of the problem. | | |

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| Grade Level/ Course (HS): 7th Grade | |
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| **Standard with code:** | **7.G.1 Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.** |
| **Domain:** | **Geometry** |
| **Cluster:** | **Draw, construct, and describe geometrical figures and describe the relationships between them.** |
| **Type: _____Knowledge _____Reasoning _____Performance Skill ___X___Product** | |

| Knowledge Targets | Reasoning Targets | Performance Skills Targets | Product Targets |
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| Use ratios and proportions to create scale drawing<br><br>Identify corresponding sides of scaled geometric figures<br><br>Compute lengths and areas from scale drawings using strategies such as proportions. | Solve problems involving scale drawings of geometric figures using scale factors. | | Reproduce a scale drawing that is proportional to a given geometric figure using a different scale. |

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| Grade Level/ Course (HS): 7th Grade | |
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| **Standard with code:** | **7.G.2 Draw (freehand, with ruler and protractor, and with technology) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle.** |
| **Domain:** | **Geometry** |
| **Cluster:** | **Draw, construct, and describe geometrical figures and describe the relationships between them.** |
| **Type: _____Knowledge _____Reasoning ____X__Performance Skill _____Product** | |

| Knowledge Targets | Reasoning Targets | Performance Skills Targets | Product Targets |
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| Know which conditions create unique triangles, more than one triangles, or no triangle. | Analyze given conditions based on the three measures of angles or sides of a triangle to determine when there is a unique triangle, more than one triangle, or no triangle. | Construct triangles from three given angle measures to determine when there is a unique triangle, more than one triangle or no triangle using appropriate tools (freehand, rulers, protractors, and technology).<br><br>Construct triangles from three given side measures to determine when there is a unique triangle, more than one triangle or no triangle using appropriate tools (freehand, rulers, protractors, and technology). | |

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| Grade Level/ Course (HS): 7th Grade | |
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| **Standard with code:** | **7.G.3 Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids.** |
| **Domain:** | **Geometry** |
| **Cluster:** | **Draw, construct, and describe geometrical figures and describe the relationships between them.** |
| **Type: _____Knowledge ___X___Reasoning _____Performance Skill _____Product** | |

| Knowledge Targets | Reasoning Targets | Performance Skills Targets | Product Targets |
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| Define slicing as the cross-section of a 3D figure.<br><br>Describe the two-dimensional figures that result from slicing a three-dimensional figure such as a right rectangular prism or pyramid. | Analyze three-dimensional shapes by examining two dimensional cross-sections. | | |

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| Grade Level/Course (High School): 7th Grade | |
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| **Standard with Code:** | **7.G.4 Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between circumference and area of a circle.** |
| **Domain:** | **Geometry** |
| **Cluster:** | **Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.** |
| **Type: _____Knowledge __X__Reasoning ___ __Performance Skill _____Product** | |

| Knowledge Targets | Reasoning Targets | Performance Skill Targets | Product Targets |
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| Know the parts of a circle including radius, diameter, area, circumference, center, and chord.<br><br>Identify $\pi$.<br><br>Know the formulas for area and circumference of a circle<br><br>Given the circumference of a circle, find its area.<br><br>Given the area of a circle, find its circumference. | Justify that $\pi$ can be derived from the circumference and diameter of a circle.<br><br>Apply circumference or area formulas to solve mathematical and real-world problems<br><br>Justify the formulas for area and circumference of a circle and how they relate to $\pi$<br><br>Informally derive the relationship between circumference and area of a circle. | | |

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| **Grade Level/Course (high School): 7th Grade** | |
| **Standard with Code:** | **7.G.5 Use facts about supplementary, complementary, vertical, adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure.** |
| **Domain:** | **Geometry** |
| **Cluster:** | **Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.** |
| **Type: _____Knowledge __X___Reasoning _____Performance Skill _____Product** | |

| **Knowledge Targets** | **Reasoning Targets** | **Performance Skill Targets** | **Product Targets** |
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| Identify and recognize types of angles: supplementary, complementary, vertical, adjacent.<br><br>Determine complements and supplements of a given angle. | Determine unknown angle measures by writing and solving algebraic equations based on relationships between angles. | | |

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| **Grade Level/Course (High School): 7th Grade** | |
| **Standard with Code:** | **7.G.6 Solve real-world and mathematical problems involving area, volume, and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.** |
| **Domain:** | **Geometry** |
| **Cluster:** | **Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.** |
| **Type: _____Knowledge __X___Reasoning _____Performance Skill _____Product** | |

| **Knowledge Targets** | | **Reasoning Targets** | | **Performance Skill Targets** | | **Product Targets** | |
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| Know the formulas for area and volume and then procedure for finding surface area and when to use them in real-world and math problems for two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms. | | Solve real-world and math problems involving area, surface area and volume of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms. | | | | | |
| Make sense of problems and persevere in solving them. | Reason abstractly and quantitatively. | Construct viable arguments and critique the reasoning of others. | Model with mathematics. | Use appropriate tools strategically. | Attend to precision. | Look for and make use of structure. | Look for and express regularity in repeated reasoning. |

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| **Grade Level/ Course (HS): 7th Grade** | |
| **Standard with code:** | **7.SP.1 Understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences.** |
| **Domain:** | **Statistics and Probability** |
| **Cluster:** | **Use random sampling to draw inferences about a population.** |
| **Type: ____Knowledge ___X___Reasoning _____Performance Skill _____Product** | |

| Knowledge Targets | Reasoning Targets | Performance Skills Targets | Product Targets |
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| Know statistics terms such as population, sample, sample size, random sampling, generalizations, valid, biased and unbiased.<br><br>Recognize sampling techniques such as convenience, random, systematic, and voluntary.<br><br>Know that generalizations about a population from a sample are valid only if the sample is representative of that population | Apply statistics to gain information about a population from a sample of the population.<br><br>Generalize that random sampling tends to produce representative samples and support valid inferences. | | |

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| **Grade Level/ Course (HS): 7th Grade** | |
| **Standard with code:** | **7.SP.2 Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions. *For example, estimate the mean word length in a book by randomly sampling words from the book; predict the winner of a school election based on randomly sampled survey data. Gauge how far off the estimate or prediction might be.*** |
| **Domain:** | **Statistics and Probability** |
| **Cluster:** | **Use random sampling to draw inferences about a population..** |
| **Type: ___Knowledge ___X___Reasoning _____Performance Skill _____Product** | |

| Knowledge Targets | Reasoning Targets | Performance Skills Targets | Product Targets |
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| Define random sample.<br><br>Identify an appropriate sample size. | Analyze & interpret data from a random sample to draw inferences about a population with an unknown characteristic of interest.<br><br>Generate multiple samples (or simulated samples) of the same size to determine the variation in estimates or predictions by comparing and contrasting the samples. | | |

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| Grade Level/ Course (HS): 7th Grade | |
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| **Standard with code:** | **7.SP.3 Informally assess the degree of visual overlap of two numerical data distributions with similar variabilities, measuring the difference between the centers by expressing it as a multiple of a measure of variability.** ***For example, the mean height of players on the basketball team is 10 cm greater than the mean height of players on the soccer team, about twice the variability (mean absolute deviation) on either team; on a dot plot, the separation between the two distributions of heights is noticeable.*** |
| **Domain:** | **Statistics and Probability** |
| **Cluster:** | **Draw informal comparative inferences about two populations** |
| **Type: _____Knowledge ___X__ Reasoning _____Performance Skill _____Product** | |

| Knowledge Targets | Reasoning Targets | Performance Skills Targets | Product Targets |
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| Identify measures of central tendency (mean, median, and mode) in a data distribution.<br><br>Identify measures of variation including upper quartile, lower quartile, upper extreme-maximum, lower extreme-minimum, range, interquartile range, and mean absolute deviation (i.e. box-and-whisker plots, line plot, dot plots, etc.). | Compare two numerical data distributions on a graph by visually comparing data displays, and assessing the degree of visual overlap.<br><br>Compare the differences in the measure of central tendency in two numerical data distributions by measuring the difference between the centers and expressing it as a multiple of a measure of variability. | | |

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| Grade Level/ Course (HS): 7th Grade | |
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| **Standard with code:** | **7.SP.4 Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations.** ***For example, decide whether the words in a chapter of a seventh-grade science book are generally longer than the words in a chapter of a fourth-grade science book.*** |
| **Domain:** | **Statistics and Probability** |
| **Cluster:** | **Draw informal comparative inferences about two populations.** |
| **Type: _____Knowledge ___X___Reasoning _____Performance Skill _____Product** | |

| Knowledge Targets | Reasoning Targets | Performance Skills Targets | Product Targets |
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| Find measures of central tendency (mean, median, and mode) and measures of variability (range, quartile, etc.). | Analyze and interpret data using measures of central tendency and variability.<br><br>Draw informal comparative inferences about two populations from random samples. | | |

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| Grade Level/ Course: 7th Grade | |
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| **Standard with code:** | **7.SP.5 Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around ½ indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event.** |
| **Domain:** | **Statistics and Probability** |
| **Cluster:** | **Investigate chance processes and develop, use, and evaluate probability models.** |
| **Type: __ ___Knowledge ___X___Reasoning _____Performance Skill _____Product** | |

| Knowledge Targets | Reasoning Targets | Performance Skills Targets | Product Targets |
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| Know that probability is expressed as a number between 0 and 1.<br><br>Know that a random event with a probability of ½ is equally likely to happen<br><br>Know that as probability moves closer to 1 it is increasingly likely to happen<br><br>Know that as probability moves closer to 0 it is decreasingly likely to happen | Draw conclusions to determine that a greater likelihood occurs as the number of favorable outcomes approaches the total number of outcomes. | | |

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| Grade Level/ Course: 7th Grade | |
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| **Standard with code:** | **7.SP.6 Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability.** ***For example, when rolling a number cube 600 times, predict that a 3 or 6 would be rolled roughly 200 times, but probably not exactly 200 times.*** |
| **Domain:** | **Statistics and Probability** |
| **Cluster:** | **Investigate chance processes and develop, use, and evaluate probability models.** |
| **Type: _____Knowledge ___X___Reasoning _____Performance Skill _____Product** | |

| Knowledge Targets | Reasoning Targets | Performance Skills Targets | Product Targets |
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| Determine relative frequency (experimental probability) is the number of times an outcome occurs divided by the total number of times the experiment is completed | Determine the relationship between experimental and theoretical probabilities by using the law of large numbers<br><br>Predict the relative frequency (experimental probability) of an event based on the (theoretical) probability | | |

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| **Grade Level/ Course: 7th Grade** | |
| **Standard with code:** | **7.SP.7ab Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy.**<br>**a. Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events. *For example, if a student is selected at random from a class, find the probability that Jane will be selected and the probability that a girl will be selected.***<br>**b. Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process. *For example, find the approximate probability that a spinning penny will land heads up or that a tossed paper cup will land open-end down. Do the outcomes for the spinning penny appear to be equally likely based on the observed frequencies?*** |
| **Domain:** | **Statistics and Probability** |
| **Cluster:** | **Investigate chance processes and develop, use, and evaluate probability models.** |
| **Type: _____Knowledge ___X ___Reasoning ___ ___Performance Skill _____Product** | |

| Knowledge Targets | Reasoning Targets | Performance Skills Targets | Product Targets |
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| Recognize uniform (equally likely) probability.<br><br>Use models to determine the probability of events | Develop a uniform probability model and use it to determine the probability of each outcome/event.<br><br>Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process.<br><br>Analyze a probability model and justify why it is uniform or explain the discrepancy if it is not. | | |

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| **Grade Level/ Course: 7th Grade** | |
| **Standard with code:** | **7.SP.8abc Find probabilities of compound events using organized lists, tables, tree diagrams, and simulations.**<br>**a. Understand that, just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs.**<br>**b. Represent sample spaces for compound events using methods such as organized lists, tables and tree diagrams. For an event described in everyday language (e.g. "rolling double sixes"), identify the outcomes in the sample space which compose the event.**<br>**c. Design and use a simulation to generate frequencies for compound events.** ***For example, use random digits as a simulation tool to approximate the answer to the question: If 40% of donors have type A blood, what is the probability that it will take at least 4 donors to find one with type A blood?*** |
| **Domain:** | **Statistics and Probability** |
| **Cluster:** | **Investigate chance processes and develop, use, and evaluate probability models.** |
| **Type: ___ ___Knowledge __X__Reasoning _____Performance Skill _____Product** | |

| Knowledge Targets | Reasoning Targets | Performance Skills Targets | Product Targets |
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| Define and describe a compound event.<br><br>Know that the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs.<br><br>Identify the outcomes in the sample space for an everyday event.<br><br>Define simulation. | Find probabilities of compound events using organized lists, tables, tree diagrams, etc. and analyze the outcomes.<br><br>Choose the appropriate method such as organized lists, tables and tree diagrams to represent sample spaces for compound events.<br><br>Design and use a simulation to generate frequencies for compound events. | | |

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